
EXPERIMENT WITH THE CULTIVATION OF DIFFERENT VARIETIES OF LUPIN IN THE AREA OF DOBŘÍŠ

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ABSTRACT

The variety experiment with lupin was placed on the fields of Cooperative Farm Nečín, which is located at: 49°47' N a 14°10' E, at an altitude around 400 m. They have grown lupin since 2005, with yields 1 or 2 t/ha and use lupin seeds for feeding milk-cows. The reason for our variety experiment was to find suitable low-alkaloid varieties of lupin for that area. The experiment lasted from 2009 to 2011. We seeded slightly different varieties each year. During three years we tested together 4 varieties of white lupin, 11 varieties of narrow-leafed lupin and 1 variety of yellow lupin. During all three years there were seeded 2 varieties of white lupin (Amiga, Dieta) and 6 varieties of narrow-leafed lupin (Boregine, Boruta, Galant, Probor, Rose, Viol). We seeded lupin during April each year. Lupin seeds were grinded (with exception of 2 varieties in 2010) and inoculated with root-nodule bacteria. After seeding we applied pre-emergent herbicides. Harvest was divided according to the sort of lupin. Narrow-leafed lupin was harvested in August or September, white or yellow lupin was harvested in September or October. In 2009 there was heavy rainfall during the vegetation period. It influenced yields of white and narrow-leafed lupin, the yields were more than 3.5 t/ha. In next two years the rainfall was lower and the yields were lower too (around 2 t/ha). It is necessary to stress that the yields during the first year were negatively influenced by the strong attack of anthracnoses. During next two years we applied suitable fungicide Amistar Xtra (1.0 l/ha). The best variety from narrow-leafed lupin was Boruta. But we found that after application of suitable fungicide white lupin can have the highest yields and highest content of Nitrogen substance in seeds. Problem has been post-emergent application of herbicides against broadleaf species.

Key words: white lupin, narrow-leafed lupin, anthracnose, yield, nitrogen substance

INTRODUCTION

Lupin was cultivated in ancient times for seeds or as green manure. But big problem was the high content of alkaloids in seeds so cultivation of lupin was not spread (Kurlovich, 2002). In the thirties of 20th century there were found the first low-alkaloid seeds of lupin and in the year 1943 in Poland there was created the first low-alkaloid (sweet) lupin Weiko II (Cowling et al., 1998). After that lupin was expanded all over the world. At the end of 20th century lupin was cultivated on the area over 1 mil. ha (Gladstones et al., 1998). In the Czech Republic lupin has been more cultivated since 2005. But the farmers had little information about cultivation of lupin and made a lot of mistakes. They chose wrong species or agrotechnology and had low yields and that was the reason they stopped cultivation of lupin. Now is lupin the third most cultivated legumes in the Czech Republic.

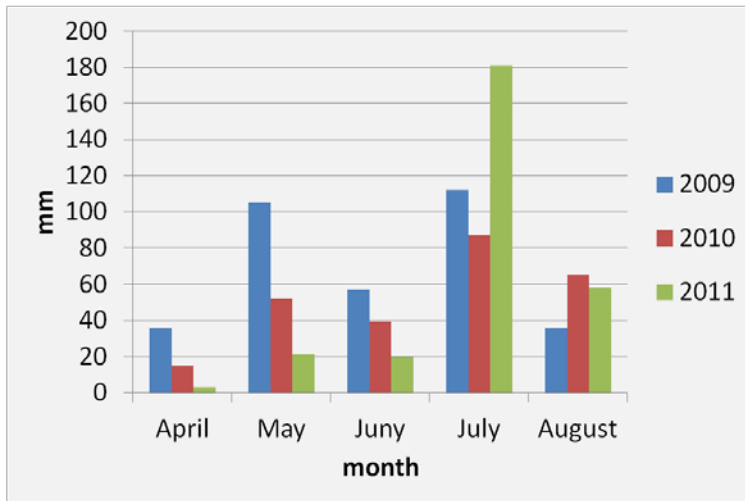
MATERIAL AND METHODS

The aim of experiment was to choose suitable species and varieties of low-alkaloid lupin for the area of Dobříš. The experiment was placed on the fields of Cooperative farm in Nečín, which is located at: 49° 47' N and 14° 10' E, at an altitude around 400 m. The farm has about 2550 ha and they have grown lupin since 2005, with yields 1 or 2 t/ha and use lupin seeds for feeding milk-cows. The experiment lasted from 2009 to 2011. During all three years we tested together 4 varieties of white lupin, 11 varieties of narrow-leafed lupin and 1 variety of yellow lupin. During all three years there were seeded 2 varieties of white lupin (Amiga, Dieta) and 6 varieties narrow-leafed lupin (Boregine, Boruta, Galant, Probor, Rose, Viol). We seeded lupin during April each year. Lupin seeds were grinded (with exception of 2 varieties in 2010) and inoculated with root-nodule bacteria. After seeding we applied pre-emergent herbicides. During experiment we studied for example weather condition, time of germination, time of flowering, time of maturity, weed infestation, density of plants or damage of anthracnose. Harvest was divided according to the species of lupin. Narrow-leafed lupin was harvested in August or September, white or yellow lupin was harvested in September or October. After harvest we made evaluation of lupin. Primary we studied yields and Nitrogen substance in seeds. We also studied seed moisture, WTS and loss during the harvest.

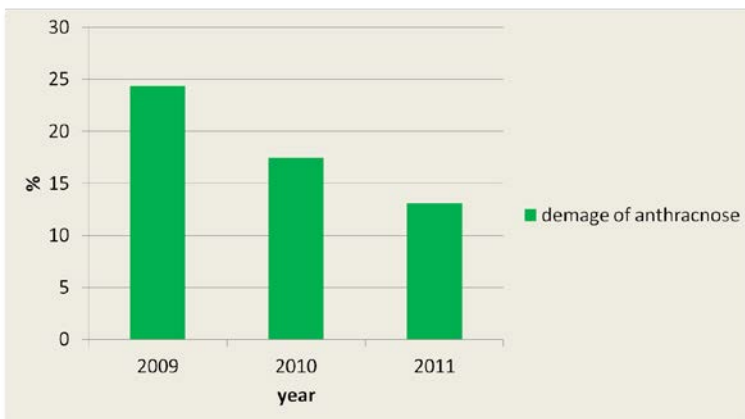
RESULTS AND DISCUSSION

Graph III. shows that the highest yield during three year period was in the year 2009. Most varieties had yields about 3,5 t/ha. The primary influence for high yield was enough rainfall during the vegetation period. The high rainfall during the time of flowering and pods creation brought high damage by Anthracnose. Vrabec (2008) reported that anthracnose is the worst disease of lupin and during few days anthracnose is capable to destroy all vegetation of lupin. In the first year we used the wrong fungicides and the damage of anthracnose was highest. Following years we used the fungicide Amistar Xtra (with active substance azoxistrobin 200 g/l and cyproconazole 80 g/l). This fungicide has a great effect and it is able to stop expansion of anthracnose. The yields in year 2010 were negatively influenced by high temperature during the time of blossoming. Lupin reacted on this stress by falling of flowers and low creation of pods. In the year 2011 the yields were lower again because during the first three months there were only 44 mm of rainfall. The big problem during years 2009 and 2010 was weed infestation of broadleaf species. Gladstones et al. (1998) present that best is to control weeds in previous crop.

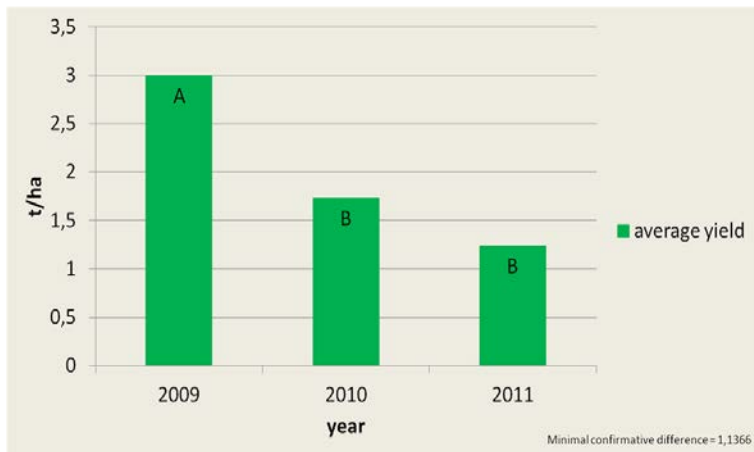
Graph I. Rainfall during vegetation 2009 - 2011



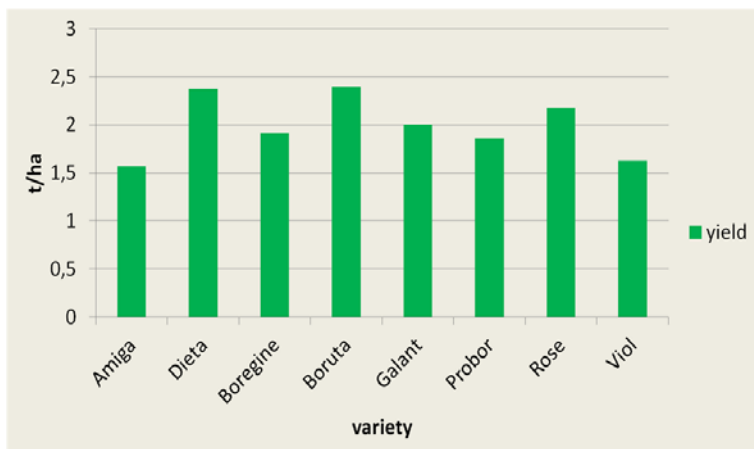
Graph II. Damage of anthracnose in years 2009 - 2011



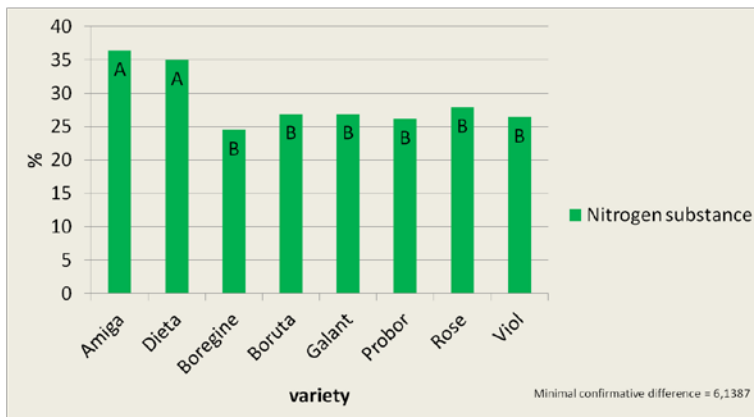
Graph III. Average yields in years 2009 - 2011



Graph IV. Average yield of all tested varieties



Graph V. Average content of Nitrogen substance in seeds



Statistical evaluation of the experiment was performed by the Tukey test of studentized extent (HSD) by using software SAS, at the level of significance of 95 %. Averages marked with the same letter are not statistically confirmative.

Picture 1. Damage of anthracnose on white lupine var. Amiga



CONCLUSIONS

The variety with highest yield was narrow-leaved lupin Boruta (terminal type), but for this terminal type we sow the highest number of plants per hectare. Almost the same yield we had for white lupin variety Dieta. With application of suitable fungicide white lupin can have the highest yield and highest content of Nitrogen substance in seeds. The next advantage of white lupin is non-shattering pods and so the period of harvest can be longer. The big problem has been post-emergent application of herbicides against broadleaf weeds. One of the possibilities of future research is to use growing stimulants against stress during vegetation. This is the way for stabilization of high yields about 4 and more tones per hectare.

LITERATURE

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